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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/621,768	07/21/2000	Blair A. Barbour	P43-5007	4912

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EXAMINER	
HESSELTINE, RYAN J	

ART UNIT	PAPER NUMBER
2623	12

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/621,768	BARBOUR, BLAIR A.	
	Examiner	Art Unit	
	Ryan J Hesseltine	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 November 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 July 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments on page 11, paragraphs 2-3, filed November 6, 2003, with respect to the declaration and the claims have been fully considered and are persuasive. The objections to the declaration and claims 16 and 19 have been withdrawn.

2. Applicant's arguments on pages 11-12, filed November 6, 2003, with respect to Barbour et al. (USPN 5,890,095) have been fully considered but they are not persuasive. On page 12, first paragraph, applicant states, "The '095 patent does not disclose the use of identifying and quantifying spatially segregated portions (e.g. in a matrix array) for each of a plurality of spatial phase characteristics." The examiner respectfully disagrees. Barbour (the '095 patent) discloses that the invention is related to data and/or images which are separated into multiple spatial phase components developed from full polarized electromagnetic radiation including light to produce enhanced data sets of a scene or area of interest in the form of data and/or images (emphasis added; column 1, line 6-11). Barbour further discloses a lenset 22 that is mounted behind a lens 14 and is part of an image enhancing assembly 20 including a retarder plate 26, a polarization matrix (wire grid) 28 and a sensor such as a focal plane array 30 such that the data is converted (quantified) into electrical signals (Figure 3; column 6, line 1-7). Additionally, Barbour discloses the use of "super" pixels consisting of at least four pixels formed in two rows and two columns with each pixel having different polarization vectors (plurality of spatial phase characteristics), wherein the "super" pixels are formed in columns and rows (matrix array) by adjoining pluralities of them together (Figures 2a and 2b; column 5, line 41-49). Barbour goes on to disclose that a grid is placed on the focal plane array having spatially segregated portions

corresponding to wire grids at 0, 45, 90, and 135 degrees respectively placed on the focal plane with (nxm) pixels (column 7, line 1-4). Each spot at the intersection of the grid corresponds to a polarization pixel ("super" pixel) at which the Stokes vector is calculated from the four pixels surrounding and joined at the intersection (column 7, line 5-12). As understood by the examiner, applicant's invention creates separate images for each spatial phase characteristic, whereas Barbour creates one image of spatially segregated portions having several spatial phase characteristics. The examiner believes that Barbour still satisfies the claim language.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-5, 7-14, 16, and 19-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Barbour et al. (USPN 5,890,095, cited on applicant's IDS), hereafter Barbour.

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

5. Regarding claims 1 and 19, Barbour discloses an apparatus and method for information extraction from electromagnetic energy via multi-characteristic spatial geometry processing (column 1, line 6-11), said apparatus/method comprising: means (collection means 52) for receiving electromagnetic energy from a source, the received electromagnetic energy having a plurality of spatial phase characteristics (column 7, line 41-49); means for separating (filtering) the plurality of spatial phase characteristics (polarizations) of the received electromagnetic energy (column 3, line 62 to column 4, line 22, line 39-50); means for identifying spatially segregated portions (pixels) of each spatial phase characteristic, with each spatially segregated portion (pixel) of each spatial phase characteristic (polarization vector) corresponding to a spatially segregated portion (pixel) of each of the other spatial phase characteristics (polarization vectors) in a group (super pixel; column 5, line 41-62; column 7, line 59-67); and means for quantifying each segregated portion (pixel) to provide a spatial phase metric (pixel value) of each segregated portion (pixel) for providing a data map (image) of the spatial phase metric (pixel value) of each separated spatial phase characteristic (polarization vector; column 7, line 41-67; column 8, line 35-45).

6. Regarding claims 2 and 22, Barbour discloses that said apparatus is an imaging apparatus for providing an image of an object as the source (column 5, line 28-40), and includes means for determining an imaging value associated with each group of corresponding segregated portions (pixels) using the spatial phase metrics (column 5, line 41-49), and means for assembling an image of the object using the determined imaging values (column 7, line 53-67).

7. Regarding claims 3, 16, and 23, Barbour discloses that the spatial phase characteristics of the electromagnetic energy include polarization characteristics of the electromagnetic energy (column 1, line 6-11; column 5, line 41-49).

8. Regarding claims 4 and 24, Barbour discloses that said means for providing a data map includes providing the map to indicate spatial phase change (column 5, line 50-67).

9. Regarding claims 5 and 25, Barbour discloses that said means for quantifying each segregated portion (pixel) to provide a spatial phase metric (polarization) includes associating an information value (polarization vector, pixel value) with each segregated portion (column 7, line 59-67).

10. Regarding claim 7, Barbour discloses that said apparatus is a single view imaging apparatus (standard video camera) for providing an image of an object as the source, and includes means for determining an imaging value associated with each group of corresponding segregated portions using the spatial phase metrics (see above discussion of claim 2), and means for assembling a three dimensional image representation of the object using the determined imaging values (column 9, line 56-65).

11. Regarding claim 8, Barbour discloses that said means for assembling a three-dimensional image representation includes means for using determined values representative of slope functions (angle of incidence, 3-D shape, object orientation) of the object (column 9, line 56-65).

12. Regarding claim 9, Barbour discloses that said means for assembling a three dimensional image representation includes means for using determined values representative of surface (3-D) shapes of the object (column 9, line 56-65).

13. Regarding claim 10, Barbour discloses that said means for assembling a three-dimensional image representation includes means for using determined values representative of surface contour (angle of incidence, 3-D shape, orientation) of the object (column 9, line 56-65).

14. Regarding claim 11, Barbour discloses that said apparatus is an imaging apparatus for providing an image of an object as the source, and includes means for determining an imaging value associated with each group of corresponding segregated portions using the spatial phase metrics (see above discussion of claims 2 and 7) and indicative of material composition of the object associated with each group of corresponding segregated portions, and means for assembling an image representation of the object indicative of material composition using the determined imaging values (column 9, line 56-65).

15. Regarding claim 12, Barbour discloses that said apparatus is an imaging apparatus for providing an image of an object obscured by an electromagnetic energy scattering media (detection through a dispersible medium) that permits a minimal amount of electromagnetic energy passage (radiation is scattered) and includes means for determining imaging values (column 7, line 59-67) from the minimal amount (reduce scattered radiation, thus increasing the detection range) of electromagnetic energy (column 9, line 37-41, line 66-column 10, line 12).

16. Regarding claims 13 and 26, Barbour discloses that said apparatus is a communication apparatus (column 9, line 5-7, 17-21) and said means for quantifying each segregated portion to provide a spatial phase metric includes determining an information value from each segregated portion (column 7, line 59-67).

17. Regarding claim 20, Barbour discloses processing the spatial phase metrics (polarization vectors) to derive information (column 8, line 15-42).

18. Regarding claim 21, Barbour discloses that said step of separating includes discerning a three-dimensional shape aspect of the ellipsoidal shape of the electromagnetic energy (column 9, line 56-65).

19. Regarding claim 27, Barbour discloses processing all spatial phase metrics to derive information (column 4, line 23-26; column 7, line 41-45).

20. Regarding claims 14 and 28, Barbour discloses an imaging apparatus and method of creating an image comprising: means (collection means 52) for receiving electromagnetic energy proceeding from an object; and means for creating an image of the object utilizing only spatial phase characteristics (polarization) of the electromagnetic energy proceeding from the object (column 6, line 24-43; column 7, line 41-67).

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

22. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour as applied to claim 1 above.

23. Regarding claim 17, Barbour discloses an imaging apparatus comprising: means (collection means 52) for receiving electromagnetic energy proceeding from an object; and means for creating an image of the object utilizing spatial phase characteristics (polarization) of the electromagnetic energy proceeding from the object (column 6, line 24-43; column 7, line 41-67). Barbour does not explicitly disclose that the electromagnetic energy conveys insufficient

characterization in the visible and infrared spectrums to permit viable intensity-based and/or frequency-based image creation, but it is disclosed that the spatial phase sensor provides for electromagnetic radiation signals across the electromagnetic spectrum to be enhanced. Therefore, if there were an insufficient characterization in the visible and infrared spectra, the spatial phase sensor of Barbour would be capable of measuring/enhancing radiation in other parts of the electromagnetic spectrum. It would have been obvious to one of ordinary skill in the art at the time the invention was made to receive electromagnetic energy which conveys insufficient characterization in the visible and infrared spectrum as taught by Barbour in order to provide for electromagnetic radiation signals across the electromagnetic spectrum to be enhanced (column 7, line 41-45).

24. Regarding claim 6, Barbour does not explicitly disclose that the electromagnetic energy conveys insufficient characterization in the visible and infrared spectrums to permit viable intensity-based and/or frequency-based image creation, but it is disclosed that the spatial phase sensor provides for electromagnetic radiation signals across the electromagnetic spectrum to be enhanced (see above discussion of claim 17).

25. Claims 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour as applied to claim 14 above, and further in view of Oshige et al. (USPN 5,311,285, cited on applicant's IDS), hereafter Oshige.

26. Regarding claim 15, Barbour does not disclose whether or not said means for receiving and said means for creating include components that move relative to each other. Oshige discloses a measuring method for ellipsometric parameters wherein the beam, which is

elliptically polarized and reflected by the sample surface, is divided into four different polarized components by stationary optical elements and no moving members are required. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize means for receiving and means for creating including components that do not move relative to each other as taught by Oshige in order to reduce the size and weight of the unit as a whole allowing installation in a narrow place, which increases the applicability of the device (column 9, line 49-64).

27. Regarding claim 18, Barbour discloses an imaging apparatus comprising: means (collection means 52) for receiving electromagnetic energy from an object (column 7, line 46-58), the received electromagnetic energy having a plurality of polarization characteristics (column 5, line 41-49); means for separating (filtering) the plurality of polarization characteristics of the received electromagnetic energy (column 3, line 62 to column 4, line 22, line 39-50); means for creating a plurality of images (super pixels), each image (super pixel) having a plurality of pixels, with each pixel of each image (super pixel) corresponding to a pixel of each of the other images (super pixels) in a group (column 5, line 41-62; column 7, line 59-67); means for quantifying a polarization metric value (vector) at each pixel of each created image; means for determining an imaging value associated with each group of pixels using the quantified values; and means for assembling an image using the determined imaging values (column 7, line 41-67; column 8, line 35-45).

28. Barbour discloses forming a plurality of pixels in predetermined patterns (super pixels) with each pixel having different polarization vectors, but does not disclose that each image is created using one of the separated (filtered) polarization characteristics (vectors). Oshige

discloses that a beam reflected from a measurement target is divided into four different polarized light components (column 6, line 33-68), which are converted into digital values (images) from which ellipsometric parameters are calculated (column 7, line 4-19). It would have been obvious to one of ordinary skill in the art at the time the invention was made to create a plurality of images each having different polarization characteristics as taught by Oshige in order to simultaneously measure and sequentially capture different polarization characteristics of one reflected light beam in a timely manner, even if the sample moves at high speed (column 7, line 20-32).

Conclusion

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPN 6,011,874 to Gluckstad discloses phase contrast imaging with simple one-to-one mapping between resolution elements of a spatial phase modulator and the generated intensity pattern. USPN 6,122,404 to Barter et al. discloses a visible Stokes polarimetric camera that separately and contemporaneously measures each of the four separate Stokes polarization parameters. USPN 6,671,390 to Barbour et al. discloses automated collection, processing and use of sports movement information via information extraction from electromagnetic energy based upon multi-characteristic spatial phase processing.

30. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J Hesseltine whose telephone number is 703-306-4069. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

rjh
January 24, 2004

JINGGE WU
PRIMARY EXAMINER